

Prepared by the Department of Mathematics

Date of Departmental Approval: November 6, 2017

Date approved by Curriculum and Programs: January 18, 2018

Effective: Fall 2018

1. Course Number: MAT220

Course Title: Discrete Mathematics and Introduction to Proofs

2. Description: This introductory course is designed for prospective mathematics and computer science majors. It covers basic techniques of mathematical proof and reasoning, with an emphasis on discrete structures as well as concepts widely used in computing. Topics include set theory, functions, relations, proposition logic, methods of proof, mathematical induction, recursion, and Boolean algebra. Additional topics in discrete mathematics will be selected from number theory, combinatorics, graph theory, and finite state automata.

3. Student Learning Outcomes (instructional objectives, intellectual skills):

Upon successful completion of this course, students are able to do the following.

- Perform set operations on finite and infinite collections of sets.
- Prove elementary results involving sets.
- Recognize the connection between set operations and logic.
- Demonstrate a working knowledge of functions, images and inverse images, one-to-one correspondences, and inverse functions.
- Construct direct proofs, indirect proofs, proofs by induction, and articulate the appropriateness of each type in a particular setting.
- Analyze and critique proofs with respect to logic and correctness.
- Create intuition-forming examples and counterexamples.
- Apply the big-O notation to evaluate the complexity of an algorithm.
- Define discrete structures by appropriate mathematical notations.
- Solve application problems using discrete modeling techniques.
- Create algorithms and write code to solve small programming problems.

4. Credit(s): 4 credits

5. Satisfies General Education Requirement: Mathematics/Quantitative Reasoning

6. Prerequisite(s): A grade C- or higher in MAT180 (Applied Calculus) or MAT195 (Precalculus with Trigonometry) or satisfactory basic skills assessment score

7. Semester(s) Offered: varies

8. Suggested General Guidelines for Evaluation: Projects, homework, quizzes, comprehensive final examination

9. General Topical Outline (Optional):